

I Claim:

1. A method for etching a hard mask layer containing a material selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride, and etching at least one metal layer containing aluminum, which comprises the steps of:

providing a substrate having thereon the metal layer, the hard mask layer, and a patterned photoresist layer overlying the hard mask layer in a plasma processing chamber;

etching the hard mask layer using a plasma etching process using an etchant source gas formed of a fluorine containing gas and oxygen, a flow rate of the oxygen being 5 to 10 % based on a flow rate of the fluorine containing gas;

etching the metal layer in the plasma processing chamber after the hard mask layer has been etched;

performing a plasma clean step to clean walls of the plasma processing chamber using an a cleaning gas formed of one of an inert gas and oxygen, after the metal layer has been etched; and

subsequently removing the patterned photoresist layer from the hard mask layer.

2. The method according to claim 1, which further comprises forming the flourine containing gas from one of CF_4 and CHF_3 .
3. The method according to claim 1, which further comprises additionally providing the etchant source gas with argon.
4. The method according to claim 1, which further comprises performing the step of etching the metal layer in the plasma processing chamber in another subsequent plasma etching process using a different composition of etching gases.
5. The method according to claim 1, which further comprises performing the step of etching the hard mask layer by etching the hard mask layer with respect to the patterned photoresist layer.